5. CERVUS SAVANNARUM. (Plate LIX.)

Cervus savannarum, Cab. in Schomb. Guian. iii. p. 785.

For some years we have had in our Gardens representatives of two nearly allied species of American Deer belonging to the group of *Cervus virginianus*. One of these has always been called *Cervus mexicanus*; the other, which was left undetermined in the last edition of the 'Catalogue of Vertebrates' (p. 49), I have until recently termed *Cervus virginianus*. Lately, however, I have convinced myself that the latter species has been wrongly named, it being much smaller than the true *C. virginianus* of N. America, and of the same size as *C. mexicanus*, and after some investigation have come to the conclusion that it is *probably* referable to the southern form of *C. virginianus*, which Cabanis has named *Cervus savannarum*.

Our male of this Deer, received March 13, 1868, was in fine condition in the spring of this year; and I now exhibit a drawing of him (Plate LIX.) by Mr. Keulemans. In winter, when the horns are shed, this Deer is very similar to *Cervus mexicanus*; but in summer he is readily distinguishable by the fine red colour of his fur and the three forward snags on his horns, as in *C. virginianus*. *Cervus mexicanus*, so far as I know, never attains more than two forward snags.

On the 15th of February last we purchased a Deer which seems to be the female of this species; so that we now have a pair of them.

6. CRAX INCOMMODA, sp. nov.

I propose to give this designation in the new Catalogue of Vertebrates to a Curassow purchased of the Jardin d'Acclimatation of Paris on the 25th of May 1870. It is a female, but of a species unknown to me, and different, so far as I can make out, from any of those mentioned in the recently published "Synopsis of the *Cracidæ*" by Mr. Salvin and myself. It most nearly resembles the female of *Crax daubentoni* *, but is readily distinguishable by the narrow white transverse undulations of the upper plumage, and the pale flesh-coloured legs. The tail is tipped with white, as in *C. daubentoni*; and the bird is of about the same size.

I hope to be able to give a figure of this bird, and of the other species of true *Crax*, in a paper which I am preparing on the subject for the Society's 'Transactions.'

4. On the Bats of the North-western Himalayas. By Capt. THOMAS HUTTON. With Notes and Corrections in Nomenclature by Prof. W. PETERS, C.M.Z.S. (Communicated by Mr. F. MOORE †.)

[Received May 14, 1872.]

Of the Bats hitherto procured in the north-western hills, four or five appear to be identical with European forms. There are, however, still others which I have not yet been able to procure; but the species already in my possession amount to twenty-three in number, belonging to various genera.

---

* See P. Z. S. 1870, p. 516.

† The specimens of Bats described in this paper were presented to the India Museum, London, in July 1871, and were, together with the Memoir, forwarded

During the broad light of day these animals frequent dark out-offices, lofts, holes in trees, wide caverns, narrow clefts in rocks and in buildings and old ruins generally; are to be found under the eaves of thatched houses, and in almost every hole between the masonry and roofing-timbers of verandahs. They are easily detected by the litter which is strewed beneath their retreats. Out of mere narrow cracks in rocks by the roadside they sometimes issue, in the early twilight, by dozens, following each other in an incessant stream for several minutes. These are the smaller *Rhinolophi*; and in such cases all are found to be of the same species; and I have never yet known more than one kind to inhabit any particular spot if at all straitened for room. Five or six individuals of *Nycticejus* may be poked out of one small hole in a verandah, but never intermingled with any other species than their own. This, however, applies only to such narrow and confined places, where they would necessarily be brought into close proximity; for in a large out-office, loft, or spacious cavern, where they can hang apart, several distinct species may occasionally be found. Confined in a box or basket, even for a few hours, I have found that *Vespertilio blythii* and some of the *Nycticeji* will prey upon each other; and this propensity may probably account for the fact of the different species when at large invariably keeping apart from each other.

The first species to be described is an old friend which occurs generally throughout India, clustering together in large trees during the day, and sallying forth in the evening; this is the well-known "*Flying Fox*" of Europeans in India, and is of large size.

Genus Pteropus.

Characters.—Head elongated, conical; muzzle tapering, fine; nostrils slightly produced; tragus none; tail short or wanting; ears lateral, ovate, elongate; wings ample; a sharp, falcate, and triangular claw at the end of the first joint of the outer finger, the point turned upwards towards the thumb; interfemoral membrane short. Frugivorous.

1. Pteropus edwardsi.

Pteropus medius, Temm.; Sykes, P. Z. S. 1830–1, p. 99.
Pteropus leucocephalus, Hodgson.
Pteropus assamensis, M'Clelland, P. Z. S.
Pteropus edwardsii, Temm.; Geoff.; Horsf.; Blyth.
"*The Flying Fox*," or "*Fox-bat*," of the Plains of India.

At Neemuch, in Western India, this species was exceedingly abundant, hanging during the daytime, in parties of six to a dozen or more, in the large mango-trees, issuing forth about dusk in

---

to Prof. Peters, of Berlin, who has very kindly examined them, and made what corrections were necessary in the identification of the species.—F. M.

search of food. Notwithstanding their strong disagreeable odour and forbidding appearance, the Kanjars, or gipsies, residing in the neighbourhood used to catch and eat them when other food was scarce or dear. Colonel Sykes mentions the occurrence of this animal in the Mahratta country, where it is called *Warbagool*, and is eaten by the lower class of native Portuguese; he testifies also to the savouriness of the flesh, having tasted it himself.

Mr. Hodgson, writing from Nipal, says of this species that "the whole head and neck, with the body below, is rufous yellow; face as far as the eyes, the body above, and the membranes deep brown; snout to rump 10 in.; expanse 46 in.; weight 22 oz." I have myself seen similarly coloured specimens at Neemuch; but why Mr. Hodgson under these circumstances should have given it the specific name of "*leucocephalus*," or white-headed, it is somewhat difficult to imagine. It is said to visit Nipal only during the autumn season, while the pears and guavas are ripening; and the same is the case in the Dehra Doon below Mussooree, where nightly visits are paid to the fruit-gardens from the middle of August to the end of September. It does not pass the day in the Doon; upon this point both natives and Europeans are agreed; and consequently each night during our fruit-season the animal in coming and going must perform a journey of from twenty-five to thirty miles at the least. A female shot at Dehra on the 20th of August, and very obligingly sent to me, presented the following characters and appearance:—

Expanse of wings 3 ft. 9½ in.; length from nose to the outer edge of the interfemoral membrane 1 ft. ¼ in.; length from the nose to between the heads of the thigh-bones, 11¼ in.; ear, from base to tip, 1½ in., pointed; carpus 6¾ in.; tibia 3¼in.; nostrils divergent, separated by a notch or groove; muzzle, ears, membranes, toes, feet, and claws intensely black; the back from the shoulders clothed with soft silky fur, also intensely black, but with here and there a scattered white hair; head brown-black or blackish brown; a rufous collar round the neck, brighter on the dorsal or upper aspect, browner below: body beneath rufous brown; wings bearing woolly rufous brown hairs on the underside, between the humerus and carpus, and the same down the edge of the carpal bone to the end of the body; interfemoral membrane emarginated by the want of a tail; heel-bone ¾ in., keeping the membrane expanded; wing attached to the two outer toes between the first and second joints; foot in the interfemoral to the ankle; greatest breadth of wing at the middle 9¼ in.; longest finger 1 ft. ½ in.; a short, broad, somewhat triangular and sharp-pointed claw curving upwards at the end of the index finger. This claw appears to be for the purpose of grasping fruit between itself and the thumb while the animal hangs suspended by the feet.

Dr. M'Clelland's description of his *Pteropus assamensis* clearly shows it to be of this species; there is in fact an almost endless variety of colouring. The Assam specimen appears to have been passing from the stage in which the above female is described into that of Mr. Hodgson's Nipal specimen.

The males are exceedingly filthy in their habits, voiding their water over the body and head, and even imbibing a small quantity; hence the unpleasant odour.

Mr. Blyth gives as the habitat:—"India generally; Ceylon, Maldives, Assam, Sylhet, Arracan, Pegu, Tenasserim, and Malayan Peninsula (?)," to which may be added the Mahratta country, Western and Northern India, thus exhibiting a very wide geographical range.

Genus CYNOPTERUS.

Characters.—Head short and broad; lips thick on the sides; tail short, nearly free; frugivorous.

2. CYNOPTERUS MARGINATUS.

Vespertilio marginatus, B. Hamilton.
Pteropus et Pachysoma titthæcheilus, Temm.
Pachysoma brevicaudata, P. diardii et duvaucellii, F. Cuvier.
Pteropus pyrivorus, Hodgson.
Pteropus dussumieri (?), Royle's Catalogue.
Cynopterus horsfieldii, C. affinis, Gray.

Native name "*Chám gidili,*" or "*Chám gidar,*" "*Evening Jackal.*"

Hab. India generally; Burmese and Malay countries; Calcutta and Nipal in the autumn months, to plunder the gardens of the ripening fruits.

Mr. Hodgson describes this species as being "wholly of an earthy brown; nude skin of lips, of joints, and of toes fleshy grey; tail very short, with its base enveloped in the interfemoral membrane, and its tip free. Snout to rump 6 inches; tail half an inch; expanse 2 feet; weight 5 oz."

In Nipal this Bat is a perfect pest, from the havoc it makes among the ripe pears and guavas. Mr. Hodgson says they are only seen in Nipal about midnight, when they come to feed from very considerable distances. "In the plains it is noted of them that they will travel from thirty to forty miles, and as many back, in the course of a single night, in order to procure food."

Although this statement seems almost incredible, yet it is nevertheless quite true; and when the insatiable voracity of the animal is taken into consideration, I can well imagine its often being compelled to travel for long distances in search of food. One that Mr. Blyth presented to me in Calcutta in 1849 appeared to be almost incessantly eating, resting only, even during the day, for a short interval of sleep, and then recommencing upon ripe guavas as if it had not seen food for a fortnight.

Although I have never yet been able to procure a specimen from Dehra, yet the gardeners assert that it is to be found there late at night during the fruit-season along with the preceding species, and that both leave the Doon before the morning. The most curious part of the proceeding consists in the animal's discovery of fruit in the valleys of Nipal and Dehra! Range over the gardens of the

Plains they both may well do; but to reach Dehra they must either cross the Siwalik range of hills, from 3000 to 3500 feet high, or thread their way for miles through the passes leading into the Doon, though even then we may ask with amazement how, when they are approaching the Siwaliks, they can tell that there is fruit some twenty miles in advance of them! To reach the valley of Nipal at 6000 feet of elevation they must ascend and descend the mountains; and, wonderful yet to say, they penetrate no further into the hills, neither do they ascend from the Doon to Mussooree, apparently instinctively knowing that they will find no guavas further in the hills! Almost equally astonishing is it that having thus feasted in the Doon and in Nipal they should be able to find their way back again through forests and hills for thirty or forty miles to their natural haunts in the plains.

Genus RHINOLOPHUS.

Characters.—Muzzle above furnished with a complicated series of membranes, forming a facial crest, in which the nostrils are situated; interfemoral membranes of moderate size, enveloping the tail; ears large, lateral, erect; the facial crest on the muzzle in the form of a horseshoe; a central raised process and a somewhat lanceolate narrow crest behind all.

3. RHINOLOPHUS LUCTUS.

Rhinolophus perniger, Hodgson, J. A. S. B. xii. 414; xiii. 484; Blyth, Cat. Mam. Mus. A. S. B.

Rhinolophus luctus, Temminck.

Hab. Lower regions of the hills; also Dehra Doon and other parts of India; Nipal, &c.

This is a large species, occurring plentifully in Mussooree and Dehra. Mr. Hodgson mentions that in Nipal it is restricted to the forests, shunning the habitations of man. This, however, in the north-western hills is certainly not the case, as I have taken it at 5500 feet, while hanging from the roof of an outhouse in which rabbits and firewood were kept, looking, with its ample black wings folded round it as a cloak, somewhat like a large black cocoon. The fact is that these larger-sized Bats could not pursue their flight in the thick forests away from the habitations of men; they require room, and find their prey in the open forests or forest glades, or over the cultivated fields and gardens; and even where man does not dwell, there are always plenty of open spaces even in forest tracts where they can wheel around the trees, and seize the beetles that are humming round them or feeding on the leaves.

Mr. Blyth seems inclined to separate this species from Mr. Hodgson's *Rhinolophus perniger*, because, as he says, the facial membranes which form the nose-crest are less complicated in the latter than in the *R. luctus* of Temminck; but these membranes in all my specimens are precisely similar to those sketched by Cassell as pertaining to *R. luctus*; and they are in no degree more complicated than those of any other species of the genus. In dried skins, no doubt, they appear to be complicated enough; and it is often impossible to say what they may have been like in the living subject; but as I invariably work with living or freshly killed specimens, I find no difficulty at all. Of *R. luctus*, Gray says, "Black, with a slight ashy tinge;" and of *R. perniger*, Hodgson observes, "Fur longish, very soft, lax, and slightly curled; colour uniform black, embrowned on the nude cutaneous parts, slightly tipped with silver on the back." Temminck's *R. luctus* is "black, tipped hoary on the back;" and precisely so are all the specimens, some fifty in number, that I have procured at Mussooree and in the Dehra Doon. All things considered, then, there does not appear to be a shade of difference between the two; and consequently I retain the name bestowed upon it by Temminck, the inapplicability of Mr. Hodgson's name being shown in the fact that the animal is "*tipped with silver* on the back," with "nude cutaneous parts *embrowned*!" To its being *black throughout*, as the name *perniger* implies, this is somewhat of a contradiction!

This fine species commences its flight rather early in the evening, and does not soar high, like the smaller bats in general, but remains below at about twenty to thirty feet from the ground, wheeling with a somewhat heavy and noiseless flight around buildings and large trees in search of small beetles and other insects. Indeed I think it may be truly said of all the larger species of Bats that they hawk for prey in the lower regions of the atmosphere, while nearly all the smaller ones ascend; and the reason is, that while the flies and minute insects are in the higher regions, the large beetles and other large insects, of which the smaller Bats could make no use, are found below among the branches of the trees.

This species appears usually to dwell in pairs, and does not associate in communities like some of the smaller Rhinolophi—though in a large cavern, affording ample room for them to hang apart, several pairs may sometimes be found. I have taken them from the roofs of outhouses, and in wide caves in limestone rocks; but they appear to fly only during the warmer months of summer, remaining (at least such is the case at Mussooree) in a semitorpid state during the winter. It is possible, however, that in the warmer south-eastern climates of Sikkim and the Cossiah hills they may be active likewise in the winter.

The animal is black all over, membranes and all, with a sprinkling of hoary ash on the back; when any parts are embrowned it is owing to the dryness of the dead specimen, and is not natural to the living animal.

♂. Carpus 3 inches; expanse of wings 18½ in.; ears 1½ in. Fur long, soft, dense, and slightly frizzled or curly. Facial crest well developed and of the ordinary type. This was a male; but a female taken in June at Dehra agrees more nearly with Mr. Hodgson's description, which was likewise taken from a female. Carpus

$2\frac{1}{2}$ in.; tibia $1\frac{1}{2}$ in.; tail 2 in.; body, from nose to insertion of tail, 4 in.; total length 6 in.; ear $1\frac{1}{2}$ in.; expanse of wings $17\frac{1}{2}$ inches. The colour as in the male.

Mr. Hodgson gives for a female:—"Snout to rump $3\frac{1}{2}$ in.; tail $2\frac{1}{8}$ in.; total $5\frac{5}{8}$ in.; expanse 17 in.; ears from anteal base $1\frac{11}{16}$ in.; forearm $2\frac{5}{8}$ in." If we suppose that these measurements, as doubtless they were, were taken from a dried skin, we shall find but little difference between them and those I have given above.

The dimensions of another male, taken in a cave at Mussooree in August, were:—carpus $2\frac{3}{4}$ in.; tibia $1\frac{1}{2}$ in.; nose to tail $4\frac{1}{4}$ in.; tail $1\frac{15}{16}$ in.: length $6\frac{3}{16}$ in.; expanse $17\frac{1}{8}$ in.; ear $1\frac{1}{2}$ in.

A female taken with it measured:—carpus 3 in.; tibia $1\frac{1}{2}$ in.; nose to tail $4\frac{10}{16}$ in.; tail $1\frac{15}{16}$ in.; length $6\frac{9}{16}$ in.; ear $1\frac{1}{2}$ in.; longest finger $4\frac{1}{2}$ in.; expanse $18\frac{1}{2}$ in.; foot in the interfemoral to the ankle, in the wing to base of toes; 2 pectoral mammæ, 2 pubic false teats; ear pointed, transversely ribbed with wrinkles; antehelix rounded. The colours in all were the same.

As regards the measurements of all Bats, it must be evident that much will depend upon age, and that this is not sufficiently attended to—besides, that there will almost always be a considerable difference between a recent specimen and a dried skin. As to the facial membranes, if the animal is preserved bodily in spirits of wine, which is the method I pursue, they will remain expanded as in life; but in a dried skin they will shrink, shrivel, and curl up to a degree that would render it next to impossible to determine what they may have been like.

4. RHINOLOPHUS AFFINIS.

Rhinolophus affinis, Horsfield, Zool. Res. in Java, pl. 8. f. A, B; Temm. Monogr. ii. p. 35.

This Bat is by no means an uncommon species at Mussooree, in the north-west, at an elevation of about 5000 to 6000 feet. A fine male captured at about 6000 feet had the carpus $2\frac{1}{16}$ in.; tibia $1\frac{1}{16}$ in.; ear $\frac{15}{16}$ in.; from nose to insertion of tail $3\frac{1}{2}$ in.; tail from vent $1\frac{3}{16}$ in.; total length $4\frac{11}{16}$ in.; expanse of wings 11 in.; longest finger 3 in.; interfemoral membrane somewhat straight, as if truncated, owing to the shortness of the tail.

Colour above dark brown with a tinge of chestnut; underside dusky brown with the same chestnut tinge, but somewhat fainter; fur long and dense, very soft, and on the underparts sparingly tipped with hoary; antihelix prominent, and divided from the outer lobe of the ear by a deep notch; somewhat ovato-quadrate in shape; ears subfalcate near the tips—which is indeed apparently more or less characteristic of the genus: facial crests as usual, the lanceolate summit somewhat broader and less acute than in other species; mouth large, face conspicuously broad and bluff, subquadrate and heavy-looking; aspect fierce; membranes dusky black.

Like the preceding, this species too is early on the wing, and may be seen in the evening twilight coursing slowly round the trees in search of insects, crunching the hard-winged beetles as it flies, with a sharp crackling sound. It often flies so low as to be easily caught in a common butterfly-net. It does not appear to be so abundant as some other kinds, and does not ascend so high as Mussooree, but in the summer rainy season is found at from 5000 to 6000 feet elevation.

5. RHINOLOPHUS ROUXII, Temm.

Rhinolophus rouxii, Temminck, Monogr. ii. p. 306.

This species was taken by me at Mussooree and in the Dehra Doon.

At Mussooree, even at an elevation of 7000 feet, it makes its appearance so early as March, remaining inactive during the winter, but in the summer months coming forth from its retreat during the very earliest hours of twilight, when it may be easily captured in a butterfly-net while skimming over the surface of a pond or tank, or wheeling rapidly, with somewhat devious flight, around the mountain-oaks (*Quercus incana*) in search of prey.

The colour of recent specimens is a rather light brown, in some rather darker on the lower part of the back, beneath somewhat paler; fur soft, dense, and moderately long; membranes dusky black; expanse of wings $12\frac{1}{2}$ in.; carpus $2\frac{1}{8}$ in.; tibia $\frac{14}{16}$ in.; ear $\frac{11}{16}$ in.; from nose to insertion of tail 3 in.; tail $\frac{14}{16}$ in.; total length of female $3\frac{14}{16}$ in. The interfemoral membrane, as will be seen by the shortness of the tail, is short, narrow, and straightened, tending towards emargination about the end of the tail; hairy to some little distance below the vent; the foot is in the wing to about $\frac{3}{16}$ in. *above the ankle*, and in the interfemoral to the ankle.

Another female had the carpus 2 in.; tibia $\frac{14}{16}$ in.; ear $\frac{11}{16}$ in.; nose to tail $2\frac{12}{16}$ in.; tail $\frac{14}{16}$ in.; total length $3\frac{10}{16}$ in. The length of the foot and claws from the heel is $\frac{1}{2}$ inch; a tinge of maroon in the fur of the back. The females have 2 pectoral mammæ and 2 false pubic teats. The measurements of another specimen, taken in September at about 5400 feet, where it flew into the lights, were:—expanse of wings 13 in.; carpus $2\frac{1}{8}$ in.; tibia $\frac{14}{16}$ in.; ear $\frac{11}{16}$ in.; nose to tail $3\frac{1}{8}$ in.; tail $\frac{14}{16}$ in.; total 4 in.; long finger $3\frac{1}{8}$ in.; heel bone $\frac{1}{2}$ in.

A specimen of this species sent to Calcutta for inspection was returned labelled "*Rhinolophus tragatus*," which, if Messrs. Hodgson and Blyth's measurements are to be depended upon, it cannot be. Neither of them notices the narrowness and semiemargination of the interfemoral membrane, which constitutes so strongly marked a feature in the species; and, indeed, Mr. Hodgson at once does away with such character by declaring the tail to be $1\frac{7}{8}$ in., or 1 inch in excess of mine!

Mr. Hodgson gives to his Nipal "*tragatus*," "length $2\frac{5}{8}$ in., and tail $1\frac{7}{8}$ in.; expanse $15\frac{1}{2}$ in.;" which would give the total length as $4\frac{1}{2}$ in. Blyth gives the carpus as "$2\frac{1}{4}$ in., and tibia $1\frac{1}{16}$ in.;" besides that, he says of the posteal nose-crest, "inconspicuous, being nearly concealed by the fur of the forehead."

The facial crest in *Rhinolophus rouxii* is much as usual in this genus, having the ordinary horseshoe-shaped membrane well defined upon the upper surface of the muzzle, in the area of which are the nostrils opening upwards; immediately behind the nostrils rises a central crest like a Roman nose, or, as Mr. Hodgson calls it, when describing *Rhinolophus tragatus*, "like a raised door-knocker!" The lower or anterior side of this is flat; behind this the crest extends backwards and upwards to the forehead, having two transverse folds or leaflets surmounted by a well-defined and prominent arrow-shaped membrane reaching beyond the base of the ears and in the middle of the forehead. There are three perpendicular or vertical grooves on the front of the lower lip or chin; but these, as well as the "door-knocker"-like process, appear to be characteristic of all the species. It is, however, almost impossible to convey an intelligible idea of these membranes to one who is not well acquainted with such animals.

6. Rhinolophus ferrum-equinum.

Rhinolophus ferrum-equinum, Schreber, t. 62.

This Bat is not uncommon in the Dehra Doon and as high as 6500 feet at Mussooree.

This species bears a very strong resemblance to the foregoing, but it is at the same time possessed of characters which fully entitle it to rank as a distinct species.

The colour of hill specimens is a light brown, rather darker on the lower part of the back; beneath the same shade, with the central line of the belly and throat a slight degree paler than on each side of it; membranes dusky black; fur long, dense, and soft. In the female the carpus is $2\frac{1}{4}$ in.; tibia 1 in.; ear $\frac{13}{16}$ in.; nose to tail $3\frac{1}{8}$ in.; tail $1\frac{5}{16}$ in.; total $4\frac{7}{16}$ in.; expanse of wings 14 in.; long finger $3\frac{7}{8}$ in.; interfemoral membrane neither truncated nor emarginate, but rounded out in consequence of the greater length of the tail; heel-spur $\frac{5}{8}$ in.; feet sparingly clothed with fine hairs; 2 pectoral mammæ, and 2 false pubic teats.

A male had carpus $2\frac{1}{4}$ in.; tibia $\frac{15}{16}$ in.; ear $\frac{14}{16}$ in.; nose to tail $3\frac{1}{8}$ in.; tail $1\frac{5}{16}$ in., tip exserted; colour brown. Another male, taken in October, had the carpus $2\frac{1}{4}$ in.; tibia $\frac{15}{16}$ in.; ear $\frac{15}{16}$ in.; nose to tail $3\frac{1}{2}$ in.; tail $1\frac{1}{2}$ in.; total 5 in.: expanse 14 in.; long finger $3\frac{6}{8}$ in.; of a beautifully soft pale mouse-brown above, somewhat paler beneath.

This species is readily distinguishable from the preceding by its somewhat superior size, and by the shape of the interfemoral membrane and longer tail.

7. Rhinolophus minor.

Rhinolophus minor, Horsfield, Zool. Res. in Java, pl. 8. f. C, D.

Hab. Mussooree, in clefts of rocks and in caves, at from 4000 to 6500 feet of elevation.

In this animal, which I obtained some years ago at Mussooree, where it is very common, the colour is brown, with a slight tinge of fulvous in some specimens, somewhat paler beneath; membranes dusky black. Male, carpus $1\frac{14}{16}$ in.; tibia $\frac{12}{16}$ in.; ear $\frac{10}{16}$ in.; nose to tail, in some 3 in., in others $3\frac{1}{4}$ in.; tail from $\frac{14}{16}$ in. to 1 in.; total from $3\frac{14}{16}$ in. to $4\frac{1}{4}$ in. in others.

Foot in both membranes to the ankles; in some the extreme tip of the tail is exserted, in others only to the edge of the membrane; interfemoral membrane straight and narrow; longest finger $2\frac{3}{4}$ inches. The female has 2 pectoral and 2 false pubic mammæ. One female had the carpus 2 inches. These are the measurements of seven specimens, males and females. Ears acuminated, erect, semifalcate, with outer lobe rounded, and divided from the interhelix as usual by a notch.

This Bat is on the wing from early in the spring to the end of autumn. I discovered it, when taking an evening walk, coming out by dozens from a narrow crack in a rock by the roadside on the hill called at Mussooree the "Camel's Back," and while it was yet quite light in the early evening. At a lower elevation I afterwards observed that when the damp mists during the rainy season were very thick, or the evening was dull and lowering, these Bats kept within their cave and did not come forth at all, being thus sometimes imprisoned for two or three nights together.

The facial crest is as usual in the genus; but the posterior vertical leaflet is exceedingly small as compared with that of the foregoing species, being a mere narrow perpendicular stile crossed by a narrow transverse bar sloping downwards.

8. RHINOLOPHUS MACROTIS.

Rhinolophus macrotis, Hodgson, J. A. S. B. xiii. 485; Blyth, Cat. Mus. A. S. B.

Hab. Nipal and Mussooree.

This is a small species, with, as the name indicates, rather unusually large ears for the size of the animal. The facial crest much as usual; but the central raised process is very much broader in proportion than usual, and the posterior perpendicular membrane is broad and somewhat elliptical in form.

Carpus $1\frac{11}{16}$ in; tibia $\frac{12}{16}$ in.; ear 1 in.; nose to tail $2\frac{1}{2}$ in.; tail $\frac{14}{16}$ in.; total length $3\frac{6}{16}$ in.; expanse 9 in.; longest finger $2\frac{3}{8}$ in.; tip of tail exserted. Colour brown, somewhat paler beneath; membranes and ears dusky black; interfemoral membrane straight and narrow; feet in both membranes to the ankle.

Another, which flew to the light in a room about 8 o'clock in September, at 5530 feet, had the carpus $1\frac{11}{16}$ in.; tibia $\frac{11}{16}$ in.; ear 1 in.; nose to tail $2\frac{6}{16}$ in.; tail 3 in.; point of tail not exserted (or perhaps broken off); interfemoral straight; feet in both membranes to the ankle.

They come out of caves in the earlier twilight hours, and may be seen flitting rapidly at some height in the air, chasing the small flies and beetles which abound during the rainy season. The above measurements are taken from recent specimens; and although they do not quite tally with those given by Messrs. Hodgson and Blyth, the species is undoubtedly correctly identified.

9. RHINOLOPHUS PETERSI.

Rhinolophus petersi, Dobson, Journ. As. Soc. Bengal, 1871.

This is a still smaller species than the last, and is found at Mussooree at an elevation of about 5503 feet, and also in the Dehra Doon.

Colour brown; membranes dusky black; carpus of male $1\frac{7}{16}$ in.; tibia $\frac{9}{16}$ in.; ear $\frac{9}{16}$ in.; nose to tail $2\frac{1}{4}$ in.; tail $\frac{12}{16}$ in.; total length 3 in.; foot in both membranes to the ankle; extreme tip of tail exserted; interfemoral short and straight.

Another male differed much in having the colours light greyish mouse-colour, rather lighter beneath. Carpus $1\frac{6}{16}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{10}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $\frac{9}{16}$ in.; total $2\frac{11}{16}$ in.; long finger rather more than 2 in.; tip of tail exserted; interfemoral narrow and straight; vertical posterior nose-leaf narrow.

It cannot be called a common species in the hills, and is found only in the warm summer months. It flies high and rapidly like the last, often coursing backwards and forwards over the same space for many minutes. One, however, proved an exception to this rule, being taken on the evening of the 23rd of August in mistake for a large Hawkmoth while skimming over a bed of flowers.

A male that was captured in a net while issuing from a cave on the 23rd August differed somewhat from the above, especially in expanse of wings, which was only $7\frac{13}{16}$ in.; carpus $1\frac{6}{16}$ in.; tibia $\frac{10}{16}$ in.; ear $\frac{10}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $\frac{13}{16}$ in.; total $2\frac{15}{16}$ in. Colour pale mouse-grey about the nape and upper part of the shoulders; hair brown on the back, beneath slightly hoary; feet in the membranes to the ankles; tip of the tail exserted. On the whole I am not satisfied that this last-mentioned individual is of the same species.

10. PHYLLORHINA ARMIGER.

Rhinolophus armiger, Hodgson, J. A. S. iv. 699.

Hipposideros armiger, Blyth, Cat. Mam. Mus. A. S. B.

Hab. The lower Himalayas from Simla to Darjiling.

This is a large species, and by no means uncommon at Mussooree. The colour above is sooty brown, beneath smoke grey, lightest at the vent; membranes sooty black; fur soft, dense, and short; expanse of wings $21\frac{1}{2}$ in.; humerus 2 in.; carpus $3\frac{5}{8}$ in.; tibia $1\frac{5}{8}$ in.; from nose to tail $5\frac{1}{4}$ in.; tail $2\frac{1}{4}$ in.; total $7\frac{1}{2}$ in.; ear $1\frac{3}{8}$ in., its inner edge with a thick band of hair; head large, bluff, and full about the face; ears pointed and transversely wrinkled, having at the outer margin two strong longitudinal ribs; foot large, in the wing and interfemoral membrane to the ankle.

The specific name was derived from a fancied resemblance between the facial crest and an escutcheon or coat-of-arms.

One specimen was captured at an elevation of 5500 feet, having been attracted one evening in April to the lights in a room; and a pair were also taken in a loft at 6000 feet in September. From this loft, the trap-door being left open, they used to issue every evening about dusk, flying with a slow deliberate flight around the house, and never departing to any great distance. They hawked about only for a short time at intervals, retiring every now and then to the loft.

When captured alive, the large ears are kept in a constant state of rapid tremulous motion, and the animal emits a low purring sound, which becomes a sharp squeak when alarmed or irritated. The feet are large, and furnished with long powerful claws of a pale hue. When suspended at rest, the tail and interfemoral membrane are turned up, not in front, like the *Rhinolophi*, but behind over the lower part of the back; neither does it appear to envelope itself in its wings so completely as does *Rh. luctus*.

I have observed in this, and in all the above-noticed *Rhinolophi*, that when disturbed the whole of the facial crests are kept in a state of constant agitation; and as the animal hangs suspended by the feet the head and muzzle are stretched forth and turned about in every direction, as if for the purpose of sniffing out the presence of danger, and ascertaining the cause of the disturbance.

Coming out of its retreat before dark, and often, indeed, about or just before sunset during the cloudy and thick misty weather of the rainy season, it may frequently be seen leisurely wheeling with noiseless, cautious, and slow steady flight around some wide-spreading oak, attracted to the spot by the loud discordant note of a large *Cicada*, or tree-cricket, which is abundant at that season in forest-tracts above 5000 feet, and only pours forth its clamorous evening-song just as the sun begins to dip below the horizon, continuing its deafening and unmusical scream for about a quarter of an hour after sunset, when it suddenly ceases altogether.

It is during this dreadfully harsh concert, when almost every tree sends forth its stunning notes, that this Bat emerges from its hiding-place, wheeling round and round the trees, scanning each branch as he slowly passes by, now rising to a higher circle, and then perchance descending to the lower branches, until at length, detecting the unfortunate minstrel all unconscious of its danger and drowned in its own melody, it darts suddenly into the tree, and snatching the still screaming insect from its perch, bears it away, still harping upon one string, and jerking out an occasional wailing note as the relentless Bat deliberately devours it on the wing. Should the swoop into the tree be fruitless, the *Cicada* instantly darts forth to seek the shelter of another tree, the Bat following its victim with a slow and steady flight, which seems to say "I'll have you yet," and then wheeling about the tree as before, but at an increased distance, patiently awaits the renewal of the song, which he no sooner hears than he summarily puts a stop to the ear-splitting clamorous note by effecting a seizure and bearing off his prey in triumph.

Like *Rh. affinis*, this species may also frequently be heard during its flight cracking and crunching the hard wings of Beetles, which in the evening hours are usually abundant among the trees. The teeth are strong, and the *tout-ensemble* of its aspect is not unlike that of a Bulldog.

A female taken from a cave in August measured :—carpus $3\frac{3}{4}$ in. ; tibia $1\frac{10}{16}$ in. ; ear $1\frac{1}{2}$ in. ; nose to tail $5\frac{6}{16}$ in. ; tail $2\frac{1}{4}$ in. ; expanse 20 in. Foot in both the membranes to the ankle ; tip of tail exserted ; membranes intensely black ; longest finger 5 in. ; fur a soft brown, with ashy tips.

Mr. Blyth tells us that this species is very closely allied to, if not identical with, *Hipposideros nobilis* of Horsfield. I doubt its identity with the Javan species. The colours he gives as "uniform light brown, with dark maroon tips to the fur of the upper parts. Length of forearm (of a large specimen) $3\frac{5}{8}$ in., and of tibia $1\frac{1}{2}$ in." This, however, is not a large specimen, but one of ordinary size.

11. PHYLLORHINA BICOLOR.

Rh. bicolor, Temm. Monogr. ii. p. 18, t. 32, f. 9, 10.

In a recent specimen the colour was uniform mouse-brown on the back, pale ashy beneath ; membranes dusky ; carpus $1\frac{5}{8}$ in. ; tibia $\frac{11}{16}$ in. ; ear 1 in. ; transverse breadth $\frac{5}{8}$ in. ; nose to tail $2\frac{2}{8}$ in. ; tail $1\frac{1}{4}$ in. ; total length $3\frac{1}{2}$ in. ; antehelix small. The facial crest consists of the horseshoe-shaped membrane on the muzzle, in the area of which are the nostrils in the form of a short longitudinal slit, and divided from each other by a slightly raised ridge. Behind the horse-shoe rises a thick transverse membrane, divided into three lobes or knobs ; and again immediately behind this is another raised tranverse canopy-like membrane, the anterior edge of which bends slightly forward. This is divided into four small chambers by three narrow septa. The whole is quadrate, and occupies the entire space between the eyes and the end of the muzzle.

My specimens were captured at an elevation of 5500 feet ; but the species, although occurring both on the hills and in the Dehra Doon, does not appear to be at all common. The ears are closely and finely ribbed transversely with a fringe of fine cilia along the inner border of the anterior margin ; semiemarginate near the summit on the external border, from which to the base it is strongly curved outwards. Feet free to the ankles ; tip of tail in the membrane, and not exserted.

Mr. Blyth has mentioned having received from the Dehra Doon a small species, which he doubtfully refers to *Hipposideros speoris*, although at the same time he admits the possibility of its proving distinct. The dimensions given by him, however, of *H. speoris* far exceed those of either of my smaller species, and prove it to be distinct from both—besides that in mine there are no lateral fringes below the eye on the muzzle, which at once decides the question. Mr. Blyth says of *H. speoris* :—"Colour nearly as in *H. armiger* ; length of carpus 2 in. ; tibia 1 in." Mr. Walter Elliot, of Madras, says :—"Carpus 2 in. ; tibia $\frac{9}{10}$ in. ; ear $\frac{6}{10}$ in. ; expanse $12\frac{1}{2}$ to 13 in. ; nose to tail $2\frac{3}{10}$ in. or female $2\frac{2}{10}$ in. ; tail 1 in. ; total length $3\frac{3}{10}$ in."

In this, then, the carpus is nearly half an inch longer ; and it has three lateral fringes in front of the eye, which are wanting in my specimens.

12. PHYLLORHINA MICROPUS, Hutton, n. sp.

If the last-mentioned species is distinguished from *H. speoris* on account of the difference in size and absence of lip-fringes, still more must the present form be distinct. It occurs in the summer months both in the lower hills and Dehra Doon. One was taken on a warm evening in September, having flown in to the lights in a room; and another was taken at the foot of the hills in the same way in October. It is by no means common.

A female has the carpus $1\frac{3}{8}$ in.; tibia $\frac{9}{16}$ in.; ear $\frac{11}{16}$ in.; nose to tail $2\frac{1}{8}$ in.; tail $1\frac{1}{16}$ in.; total $3\frac{11}{16}$ in.; expanse $9\frac{1}{8}$ in. Colour above soft hair-brown, beneath dull ashy; membranes and ears dusky black; feet small, free to the ankles; ears closely ribbed transversely, and with a fringe of fine hair inside the small obtuse antihelix; ears and feet conspicuously smaller than in the last. Facial crest smaller than in *Rhinolophus macrotis*; and the transverse rib behind the nostrils is not three-lobed, but has one thick knob in its centre projecting forwards. The extreme tip of the tail is exserted beyond the membrane; no lateral fringes on the upper lip.

Type in coll. India Museum, London.

Genus BARBASTELLUS.

Characters.—Ears large, broad, subquadrate, slightly emarginate near the tip, which is rounded; outer edge of the ear rounded, and coming well round to the front of the tragus; tragus subtriangular, the base broad and narrowing upwards to end in a rounded top; ears approximate over the forehead, touching at the base, but not joined; muzzle short, flat, and truncated, the end divided from the cheeks by a deep groove, ascending in front from the edge of the upper lip, and proceeding back on each side in a lunate form to the junction of the ears in front, forming a pit on the upper surface of the muzzle; nostrils placed *laterally* at the top of the muzzle, not above; tail long: forehead rising immediately behind the ears, and well covered with fur; muzzle seminude and gibbous; eyes placed at the base of the ear, in front of the tragus, and almost within the ear.

13. BARBASTELLUS COMMUNIS.

Vespertilio barbastellus, Schreber; Gmel.

Barbastellus communis, Gray, Ann. & Mag. Nat. Hist.; Blyth, Cat. Mam. Mus. A. S. B.

Hab. Europe and Subhimalayan regions at Mussooree.

I have taken this species as high as 6500 feet; but it appears to be far more numerous at the lower elevation of 5500 feet. Mr. Hodgson does not appear to have met with it in Nipal.

It is perfectly surprising to see into what very narrow holes and mere crevices these animals can squeeze themselves, and where, but for the litter below, they might remain undetected for ever.

The colour is a deep blackish brown, tipped with hoary; carpus $1\frac{11}{16}$ in.; tibia $\frac{12}{16}$ in.; from nose to tail $2\frac{5}{8}$ in.; tail from vent $1\frac{7}{8}$ in.; total length $4\frac{1}{2}$ in.; ear $\frac{3}{4}$ in.; heel-bone $\frac{3}{4}$ in.; expanse of wings, 11 in. Tragus slightly bending outwards, half the length of the ear, subtriangular, base broad, narrowing upwards to the summit, which is rounded.

Fleming places this Bat in the genus *Plecotus*, on account of the approximation of the ears, which, he says, are "united at their inner edges above the eyes." The junction is merely at the base, on a line with the eyes, and is not an actual union, but simply a contact of the inner basal edges. In his measurement the expanse agrees with mine, but the length is half an inch less; this doubtless proceeds from his having had dried skins only.

This is a common species during the whole of the summer months; but as it is never seen in the winter, I conclude that it hibernates in its retreat. It comes forth rather late in the evening, and after the twilight has deepened into the first shades of night. They appear to be very inconstant visitors, as for two years they occupied a hole in the roof of an upper story, but made such a litter on the floor that it was determined to dislodge them. The first year they remained unmolested, but in the second year several of them were caught and preserved; in the third year not one was visible, nor did they return again. They were in dozens for those two years.

Mr. Blyth, in his 'Catalogue of Mammalia in the Museum of the Asiatic Society of Bengal,' falls into a curious error in regard to *Nyctophilus geoffroyi*, which he says he received from Captain F. Hutton, from Masuri, while yet he states the *genus* to be Australian. But I have no specimen by me, nor do I know that I ever saw one. In 1844, the year in which he says he received it, I was certainly the only Captain Hutton at Musooree, and my initial is not *F.*, but T. Another very frequent error of the same writer consists in his placing the Tyne range of hills to the north of Simla, instead of immediately at the back of Musooree, from which it is separated only by a broad, deep, trough-like valley.

If the species were really received from me, it must have been procured north of the Tyne range, and sent down to Calcutta mixed up with specimens of *Barbastellus communis*.

Genus Plecotus (Geoffr.).

Generic characters.—Ears very large, erect, and oblong ovate, united at the base over the forehead; incisors $\frac{4}{6}$, molars $\frac{5 \cdot 5}{6 \cdot 6}$.

14. Plecotus auritus. (The Long-eared Bat.)

Vespertilio minor, Brisson, Quad. 226.

Vesp. auritus, Linn. Syst. Nat.; Geoff. An. Mus.; Kuhl, Deutsch. Flederm.; Desmar, Mam.; Jenyns, Brit. Vert.

Plecotus auritus, Geoff.; Gray, Zool. Journ.; Flem. Brit. An.

L'Oreillard, Daub. Mém. Acad.; Buffon.

Long-eared Bat, Penn. Brit. Quad.

Length from the nose to insertion of tail $2\frac{1}{4}$ in.; tail $2\frac{1}{8}$ in.; total length $4\frac{3}{8}$ in.; ear $1\frac{1}{2}$ in.; tragus $\frac{5}{8}$ in.; carpus $1\frac{3}{4}$ in.; tibia $\frac{3}{4}$ in. The tip of the tail obtuse, and exserted beyond the edge of the membrane about $\frac{1}{8}$ in. Fur brownish-grey above, rather paler beneath. Female.

My specimen is a female, and was received from the central region of the hills through the kindness of Mr. F. Wilson, and, with the exception of some of the dimensions, as given by Bell in his 'British Quadrupeds,' is, I think, undistinguishable from the English species.

Bell's description, indeed, is precisely that which I should have given of the Himalayan specimen; for the trifling differences in the dimensions may be due to age, or sex, or even to the condition of the specimens when measured. Mine was preserved in spirits of wine, while probably Bell described from a dried skin, which would be quite sufficient to account for most of the differences. One thing he has omitted to mention, although he indicates it in the figure of the head at page 57—namely, that proceeding from the nostrils, and running back to the base of the muzzle, is a narrow open groove.

This little Bat, so remarkable for the great length of the ears in proportion to the size of the body and head, is found during the summer months far in the interior of the mountains in the northern portion of the central region. It does not occur at Mussooree, nor in the immediate neighbourhood.

Bell says of *P. auritus*:—"The inner margin of the ear is bent back from the middle cartilage, forming a broad longitudinal fold, which is ciliated at its edge, as well as along the carina formed by its duplicature" *.

In the 16th volume of the 'Journal of the Asiatic Society of Bengal' Mr. Hodgson has described a species under the name of *P. homochrous,* from the central region, but which Mr. Blyth has placed as a synonym of *P. auritus,* which I also should have been inclined to do, had not Mr. Hodgson distinctly stated that the "ears were disunited" at the base, in which case it can be neither *P. auritus* nor a true member of the genus. It is stated likewise that the ears are nude, as in mine, which possibly might have had some weight in identifying it with my species, but for the disunion of the ears. The same naturalist notices a species as *P. dargilingensis,* which Blyth, rightly or wrongly I know not, also doubles up with *P. auritus.* Hodgson assigns a different dentition from the *P. auritus,* making the molars $\frac{4.4}{5.5}$ instead of $\frac{5.5}{6.6}$, as Bell gives them; from which facts it is clear that Hodgson's Bat must belong to a different genus. *P. auritus* is found also in the Simla hills.

We now come to the genus *Scotophilus,* which, as at present defined by Mr. Gray, is altogether unsatisfactory. That gentleman says:—"I am inclined to confine the genus *Scotophilus* to those species which have the wings attached to the ankles as far as the base of the toes,—as *Scot. temminckii* and *Scot. fulvus* of Asia, which have the interfemoral membrane smooth; as in *Scot. serotinus, Scot. discolor, Scot. leisleri*, and *Scot. murinus* of Europe, and *Scot. lobatus* of India, which have cross lines of hair on the underside of the interfemoral membrane." He thus merges *Nycticejus* in what he would make out to be *Scotophilus*, saying that the former is but an old, and the latter a young specimen of the same genus. In this case, however, on the principle of "*seniores priores*," the adult ought to stand as the type of the genus, and not the immature one; and hence I have adopted *Nycticejus*, of Rafinesque, in preference to *Scotophilus*, of Leach, the more especially as Mr. Gray's own definition of the latter excludes the species he cites as belonging to it; for when he says "I am inclined to confine this genus to the species which have the wings attached to the ankle *as far as the* base of the toes," and then cites *Scot. leisleri* as an example, we perceive at once the worthlessness of the genus, and of the definition also, inasmuch as the latter species has *the feet and ankles entirely free*, both the membranes being attached to the tibia *above the ankle**!

---

* This description applies equally well to my specimen also, in which the back of the ear is perfectly nude.

Genus NYCTICEJUS.

Characters.—Face bluff and swollen on the sides; muzzle nearly nude in front; wings and ears thick, rather coriaceous; muzzle short; ears wide apart, at the sides of the head; inner margin of ear angular, the outer margin continued round almost to the gape or angle of the mouth; tragus falcate, tapering up to a point, half the length of the ear; head above broad and flattened; nostrils prominent at the end of the muzzle; feet in the wing to the base of the toe, in the interfemoral membrane to the ankle; eyes small and low down.

15. NYCTICEJUS LUTEUS.

Nyct. flaveolus, Blyth; Horsf. Cat. Mamm. Ind. Mus.
Scot. temminckii, Gray.
Nyct. luteus, Blyth, Cat. Mam. Mus. A. S. B.
Hab. Bengal, Sylhet, Assam, Burmah, Dehra Doon.

This species, as far as I have been able to ascertain, never ascends the hills of the north-west, although it is abundant at elevations of 2000 to 3000 feet, as at Rajpore, at the foot of the Mussooree range.

The colour of the animal when alive is a greenish olive-brown on the back; underparts silky yellow, often shining or glossy; membranes dusky black; carpus $2\frac{7}{16}$ in.; expanse $16\frac{1}{4}$ in.; greatest breadth of wing 3 in.; from nose to tail $4\frac{1}{4}$ in.; tail from vent $2\frac{1}{4}$ in.; total $6\frac{1}{2}$ in. Interfemoral membrane paler beneath than above; feet half free, being in the wing to the base of the outer toe, and in the interfemoral membrane to the ankle; membranes nude; ears $\frac{3}{4}$ in. apart, thus showing the great breadth of the head; length of head about 1 inch; face bluff; head thick-looking, flat-crowned, and large; muzzle nude; lips and cheeks tumid; the external margin of the ear extending forwards to the gape; tragus obtusely pointed, falcate, and turning inwards; extreme tip of the tail exserted for one joint beyond the membrane; heel-bone reaching to about $\frac{2}{3}$ of the distance between the heel and the tail. In the male the colours are brighter than in the female.

---

* *Remark by Prof. Peters.*—Captain Hutton has determined erroneously *Miniopterus blepotis* as *Scot. leisleri*.

In the daytime this Bat is found sometimes singly, sometimes in pairs, and again in small parties of five or six, hanging from the roofs of outhouses, sheds, verandahs, and large open halls and temples, coming out about dusk. Tongue closely studded with papillæ; fur short and close.

16. VESPERUGO LEISLERI.

Vesp. leisleri, Kuhl; Bell, Brit. Quadr. pp. 18, 20.

This bat is far from common at Mussooree, and appears to be confined to an elevation ranging from 4500 to 5500 feet, on the northern side of the Tyne range, immediately beyond Mussooree.

The outer margin of the ear is continued round, as in the former, down to the gape; and the head has the same bluff and tumid appearance; the ears also are wide apart and angular on the inner margin, and the top of the head is flattened; the tragus is rather short, and somewhat kidney-shaped, rounded at the summit and turning inwards; colour of the fur dark brown, with a chestnut tinge, beneath paler and somewhat greyish; the aspect is exceedingly surly in expression; feet in the wing to the base of the outer toes, in the interfemoral to the ankle; the muzzle is bare; the lips are tumid and warty; muzzle short, broad, thick; ears ovato-triangular.

The 'Naturalist's Library' errs in saying that the tragus is elongated. The length of the head and body is given as 2 inches 9 lines. Bell gives 2 inches 11 lines. Again, in the former the tail is 2 inches, and expanse from 12 to 14 inches; while Bell gives "tail 1 inch 8 lines; expanse 13 inches 8 lines, to 14 inches and upwards." An Himalayan specimen, a male, has the carpus $1\frac{1}{16}$ in.; tibia $\frac{10}{16}$ in.; ear $\frac{1}{2}$ in.; nose to tail $3\frac{1}{8}$ in.; tail $2\frac{1}{8}$ in.; total length $5\frac{1}{4}$ in.; tragus short, kidney-form, and rounded at top.

17. VESPERUGO IMBRICATUS.

Vesp. imbricatus, Horsf.: Temm. Monogr. ii. p. 216.

Hab. Mussooree.

This is a smaller species, and was taken at an elevation of about 6000 feet, generally from holes under the thatch of houses. The specific name is derived from a narrow gorget or collar, extending over the breast or lower part of the neck, from shoulder to shoulder.

One male had the carpus $1\frac{1}{4}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{6}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $1\frac{6}{16}$ in.; the generic characters like the two preceding.

Another male had the carpus $1\frac{1}{4}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{6}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $1\frac{6}{16}$ in.; total length $3\frac{1}{2}$ in. The measurements are thus the same in both.

Muzzle pale brown, flat above, rather hollow; from the forehead back to the rump dark brown; tragus nearly half the length of the ear, rather pointed and narrow, subfalcate, and turning inwards; longest finger about $2\frac{1}{4}$ inches.

18. VESPERUGO MICROPUS, Hutton, n. sp.

This is the smallest of the genus I have yet found at Mussooree. It is rather a common species, both at Mussooree and in the Dehra Doon. It lives in communities, in holes in walls, and caves, and under the eaves of houses.

A male from Dehra measured as follows:—Carpus $1\frac{3}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; from nose to tail rather less than 2 in.; tail $1\frac{6}{16}$ in.; total rather less than $3\frac{6}{16}$ in. Above brown; beneath greyish-brown; foot in the wing to the toes, in the interfemoral to the ankle. Expanse 8 inches.

A younger male from Dehra measured:—carpus 1 in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; nose to tail $1\frac{10}{16}$ in.; tail $1\frac{3}{16}$ in.; total length $2\frac{13}{16}$ in.

The measurements of three females were the same, except that there was a slight difference in the length of the body, some being $1\frac{3}{4}$ in., others nearly 2 in. long.

♂. Carpus $1\frac{3}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; nose to tail $1\frac{3}{4}$ in.; tail $1\frac{1}{2}$ in.; total $3\frac{1}{4}$ in.

♂. Carpus $1\frac{3}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; nose to tail $1\frac{3}{4}$ in.; tail $1\frac{3}{8}$ in.; total $2\frac{15}{16}$ in.

♂. Carpus $1\frac{3}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; nose to tail nearly 2 in.; tail $1\frac{6}{16}$ in.; total $3\frac{6}{16}$ in., nearly.

In all the muzzle is flat above; tragus scarcely half the length of the ear; feet very small, hence the specific name; thumb-claw short and feeble; outer margin of the ear coming round to the gape; brown above, greyish-brown beneath; the longest finger about $2\frac{1}{4}$ inches.

When touched, or suddenly disturbed during the day, it opens wide the mouth, without uttering any sound or making the least attempt to bite, and will thus keep it open for several minutes, as if overpowered by sleep, or too lazy to reshut it. It makes no attempt to escape.

From Delhi, where it is said to be very numerous in the Kootub Minar, I have received two females, which for the present I must refer to this species, with which they agree tolerably well in all the measurements, except in having the length of the body much greater, viz.:—carpus $1\frac{3}{16}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{5}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $1\frac{2}{16}$ in.; total length $3\frac{1}{4}$ in.; tip of tail free. Another had the carpus $1\frac{2}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{5}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $1\frac{2}{16}$ in.; total length $3\frac{1}{4}$ in. The colour is the same, and feet in the wing to the base of the outer toe, in the interfemoral to the ankle; outer margin of the ear extending round to the gape; tragus short, narrow, subfalcate, and pointed; feet small.

[Type in India Museum, London.—F. M.]

19. MINIOPTERUS BLEPOTIS.

Vesp. blepotis, Temm. Monogr. ii. p. 212, t. 53. f. 1, 2.

This species occurs from 2000 feet to 7000 feet of elevation in the N.W. Himalaya. It is found more abundantly in the valleys north of the Tyne range, beyond Mussooree.

The head is round on the top, and well clothed with fur; muzzle short and clothed; ears short, quadrato-triangular, and placed low on the sides of the head, on a level with the gape, the outer margin extending forward nearly to the gape; tragus short, rounded above, scarcely $\frac{1}{3}$ the length of the ear; fur soft, close, dense, and with a velvety feel.

Colour above snuff-brown, greyish-brown beneath; membranes dusky black, as are the ears; carpus $1\frac{7}{8}$ in.; tibia $\frac{6}{8}$ in.; nose to tail 3 in.; tail $2\frac{1}{8}$ in.; total length $5\frac{1}{8}$ in.; expanse 13 in.; both membranes attached to the tibia, about a quarter of an inch above the ankle. A hairy band (whence the generic name) extends down the carpus beneath nearly to the wrist.

Another one from Dehra, a male, had the carpus 2 in.; tibia $\frac{12}{16}$ in.; ear $\frac{1}{4}$ in.; nose to tail $2\frac{12}{16}$ in.; tail $2\frac{1}{4}$ in.; total length 5 in. Colour brown, with chestnut tinge.

This species is found at Mussooree, in caves and caverns, and even crevices in rocks, and is occasionally attracted to the lamps in a room.

I have never yet met with a specimen of this Bat that was not infested with *ticks*!

20. VESPERTILIO BLYTHII, Tomes.

Vesp. blythii, Tomes, P. Z. S. 1857, p. 53.

Hab. North-western Himalaya.

This fine species, although apparently somewhat rare at Mussooree, is not uncommon in the valleys north of the Tyne range, being there found numerously in caves.

The carpus of a male was $2\frac{1}{4}$ in.; tibia 1 in.; ear $\frac{7}{8}$ in.; expanse of wings 14 in.; nose to tail $3\frac{1}{8}$ in.; tail $2\frac{1}{2}$ in.; total length $5\frac{5}{8}$ in.; longest finger 4 in.

A female had the carpus $2\frac{3}{8}$ in.; ear $\frac{6}{8}$ in.; nose to tail 3 in.; tail $2\frac{1}{2}$ in.; total length $5\frac{1}{2}$ in.; longest finger $3\frac{1}{4}$ in.; expanse 15 in.

Colour above pale brown, greyish brown beneath; ears and tragus long, the latter falcate, bending outwards; outer margin of the ear reaching forward to beneath the eye, and nearly halfway to the gape; tragus nearly half the length of the ear, narrowing upwards to an obtuse point; membranes dusky; interfemoral naked above and below; feet half free, in the wing to the base of the outer toe, in the interfemoral to the ankle; feet large and strong, with a few scattered hairs above; toes freely and widely opening from each other, so as to give a large grasp; claws compressed and sickle-shaped, rather feeble; the tip of the tail exserted.

When confined with other Bats this species attacks and kills all the weaker ones, devouring a portion of the flesh also.

I strongly suspect Mr. Hodgson's *Vespertilio muricola* to be none other than this. Dr. Gray says of it :—" Feet large, elongate, half free; tragus elongated, lanceolate, subfalcate." Mr. Hodgson did not describe it.

21. Vespertilio adversus.

Vesp. adversus, Horsfield, Zool. Res. in Java; Temm. Monogr. ii. p. 221.

This is a small species. The fur is somewhat long, dense, silky to the feel, and slightly frizzled or wavy; colour deep black, with the tips hoary on the underparts, and in some lights with a faint tinge of chestnut on the back; ears and membranes also black; nose, feet, and claws the same, giving the animal a very sombre and lugubrious appearance.

The foot is very small, and in the wing to the base of the outer toe, in the interfemoral to the ankle.

Carpus $1\frac{6}{16}$ in.; tibia $\frac{9}{16}$ in.; ear $\frac{1}{2}$ in.; nose to tail $1\frac{13}{16}$ in.; tail $1\frac{1}{2}$ in.; total length $3\frac{5}{16}$ in.; expanse $9\frac{14}{16}$ in.; tragus $\frac{3}{16}$ in.; Taken on 14th September. Another had the carpus $1\frac{1}{16}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{1}{2}$ in.; nose to tail $1\frac{13}{16}$; tail $1\frac{1}{2}$ in.; total length $3\frac{5}{16}$ in.; expanse $9\frac{14}{16}$ in.; tragus $\frac{3}{16}$ in., falcate. Taken the 30th September.

A third, a male, had the carpus $1\frac{6}{16}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{1}{2}$ in.; nose to tail $1\frac{10}{16}$ in.; tail $1\frac{6}{16}$ in.; total length 3 in.

A fourth, a female, differed only in being from nose to tail $1\frac{14}{16}$ in.

A fifth had the carpus $1\frac{1}{4}$ in.; nose to tail $1\frac{10}{16}$ in.; in other respects the same. These then, allowing for age and sex, are evidently all the same species; and all were recent specimens.

The ears are wide apart, placed low on the side of the head, the base being on a level with the gape, and the ear directed outwards. The shape would be a long oval, were it not for the deep emargination of the outer edge, from which point to the base the lower part of the lobe looks like a small second ear. The tragus is short, pointing inwards, with an obtuse rounded top.

This is a common species at Mussooree and in the Dehra Doon. It is early on the wing, coming out of caves and hollow trees, flying high, and is very rapid in its movements. Like *Vespervgo micropus*, when touched it opens the mouth wide, without emitting a sound, or making the least attempt to escape or bite, and will thus keep on the gape for several minutes, as if too much overpowered by sleep to be at the trouble of shutting it again, allowing it gradually and slowly to close, as if of its own accord.

Genus Kerivoula.

Characters.—Feet half free; face hairy; ears lateral, diverging outwards; inner margin obtusely angular, outer margin rather sinuated; form, a long oval; tragus slightly falcate, narrow, bending outwards, half the length of the ear; nostrils at the end of the muzzle, divided by a slight notch; feet large; tail long; head broad; thumb long.

22. Kerivoula formosa.

Vesp. formosa, Hodgson, J. A. S. B. iv. p. 700.

Kerivoula formosa, Gray, Cat. Nip. Mam.; Cat. Mamm. Brit. Mus.

Hab. Nipal, Dehra Doon, and Lower Mussooree.

This handsome species, which was discovered by Mr. Hodgson in Nipal, occurs plentifully in the Dehra Doon, and at Mussooree, up to about 5500 feet.

Carpus of a male $1\frac{15}{16}$ in.; tibia $\frac{15}{16}$ in.; ear $\frac{11}{16}$ in.; feet large, and in the wing to the base of the outer toe, in the interfemoral to the ankle; tip of the tail free.

A female had the carpus $1\frac{15}{16}$ in.; tibia $\frac{15}{16}$ in.; ear $\frac{11}{16}$ in.; nose to tail $2\frac{14}{16}$ in.; tail 2 in.; total $4\frac{14}{16}$ in.; tragus half the length of the ear; ears diverging outwards, obtusely pointed, outer margin sinuate; nostrils at the end of the muzzle, slightly divergent; muzzle clothed, depressed. Taken in July.

Mr. Hodgson gives :—"Snout to rump $2\frac{1}{2}$ in.; tail 2 in.; total $4\frac{1}{2}$ in.; expanse $12\frac{1}{2}$ in.; teeth $\frac{2.2}{6}$, $\frac{1.1}{1.1}$, $\frac{6.6}{6.6}=38$."

The membranes, fingers, and ears are, in fresh or living specimens, bright ferruginous orange, except between the fingers, where the central line of the membranes is dusky black, contrasting strongly with the light orange; a small irregular dusky spot on the wing near the shoulder; face ferruginous yellow; body from the shoulders downwards ashy or dusky grey, with a faint tinge of ferruginous; head and breast paler; the claws and ends of the toes black; face rather obtusely sharp and projecting.

When preserved in spirits of wine, the orange-colour which gives so much beauty to the animal very shortly fades away.

Mr. Blyth notices another species from Central India, under the name of *K. pallida,* but by some curious error describes the *tail* as being "15 inches," or $1\frac{1}{4}$ foot!—the animal being about the size of the above.

23. Harpyiocephalus huttonii, Peters, n. sp.

This species occurs at about 5500 feet elevation on the outer southern range, but does not appear to be very common in the hills, judging from the paucity of specimens procured; and the Dehra Doon is probably its true locality.

Colour above light snuff-brown, somewhat paler beneath; carpus $1\frac{6}{16}$ in.; tibia $\frac{11}{16}$ in.; tail $1\frac{6}{16}$ in.; nose to tail $2\frac{1}{2}$ in.; total length $3\frac{14}{16}$ in.; expanse of wing about 10 in.; foot in the wing to the end of the second joint of the outer toe; interfemoral attached to the ankle, hairy externally, but nude beneath, with numerous cross lines.

The nostrils are subtubular and divergent, divided by a slight notch; and the ears are at the side of the head, rather large, and rounded at the summit; extreme tip of tail exserted beyond the membrane; tragus subfalciform, narrow towards the summit; feet somewhat hairy externally.

One of these flew into a room at Jeripanee, below Mussooree, attracted by the lights, on the 25th July, at about 9 o'clock. Instead of soaring round the room towards the ceiling, as Bats generally do, it kept low down, passing under the tables and chairs, as if afraid to emerge into the broad glare of the lamps. This likewise is the mode of flight when searching for insects in the open fields, where it skims closely and somewhat leisurely over the surface of the crops and grass.

[Type in coll. India Museum, London.—F. M.]

24. Murina grisea, Hutton, n. sp.

This species was taken at Jeripanee at an elevation of 5500 feet; and as yet I have only seen this one specimen.

Carpus $1\frac{6}{16}$ in.; tibia $\frac{6}{16}$ in.; ear $\frac{7}{16}$ in.; nose to tail 2 in.; tail 1 in.; total length 3 in.; expanse of wings rather more than 9 in.; foot in the wing to the base of the toe, in the interfemoral to the ankle; tip of tail slightly exserted beyond the membrane; nostrils subtubular and divergent, giving the nose a notched appearance; tip of tail exserted; feet externally hairy; interfemoral hairy within and without; ears rather small, obtusely pointed, shaped as in *Rhinolophus*; colour above grey mouse-brown, beneath paler grey.

[Type in coll. India Museum, London.—F. M.]

Genus Megaderma.

Generic characters.—Ears very large, and united by their inner margins over the forehead, as in *Plecotus*; wings and interfemoral membranes large; mouth suctorial; on the extremity of the muzzle above is a thin saucer-shaped transverse membrane, in which are the nostrils; out of and behind this arises a broad membrane or leaflet; tragus narrow, falcate, bending outwards, less than a third of the ear; tail none.

25. Megaderma lyra.

Meg. carnatica, Elliot, Cat. Mamm. S. Ind.
Meg. schistacea, Hodgs. (*apud* Blyth).
Meg. lyra, Geoff. An. Mus.; J. A. S. B. xi. & xii.
Hab. India generally, nearly to the Siwaliks in the north-west.

My specimens were procured at Delhi, in the Kootub, and measured as follows:—Carpus $2\frac{9}{16}$ in.; tibia $1\frac{6}{16}$ in.; ear $1\frac{5}{16}$ in.; rounded above; tragus about $\frac{1}{3}$ the length of the ear, pointed and subfalcate, with a projecting leaflet at its base, which is notched on the inner edge; ears joined together on the forehead for nearly half their length; feet in the wing to the base of the outer toe, in the interfemoral membrane to the ankle; fur, on the head, back, humerus, and lower half of the carpus, black; membranes and ears brownish, naked; beneath iron-grey; on the upper surface of the muzzle is a small subquadrate leaflet, somewhat saucer-shaped, in which are the nostrils concealed beneath an overlying lappet of membrane, immediately behind which rises an oblong square membrane, with a thick perpendicular rib running up through the middle; there is no tail.

Although perhaps from the character of the mouth it might have been inferred that the habits of this animal were sanguivorous, yet nothing of the kind appears to have been suspected until the fact was made known by Mr. Blyth, who records the circumstance in an interesting notice in the 'Journal of the Asiatic Society of Calcutta,' vol. xi. p. 225:—

"Chancing," says this observer, "one evening to see a rather large Bat enter an outhouse, from which there was no other egress than by the doorway, I was fortunate in being able to procure a light, and thus proceed to the capture of the animal. Upon finding itself pursued, it took three or four turns round the apartment, when down dropped what at the moment I supposed to be its young, and which I deposited in my handkerchief. After a somewhat tedious chase I then secured the object of my pursuit, which proved to be a fine pregnant female of *Megaderma lyra*. I then looked at the other Bat which I had picked up, and, to my surprise, found it to be a small *Vespertilio*, nearly allied to the European *V. pipistrellus*, which is exceedingly abundant, not only here, but apparently throughout India, being the same also, to all appearance, as a small species which my friend Dr. Cantor procured in Chusan. The individual now referred to was feeble from loss of blood, which it was evident the *Megaderma* had been sucking from a large and still bleeding wound under and behind the ear; and the very obviously suctorial form of the mouth of the vampyre was of itself sufficient to hint the strong probability of such being the case. During the very short time that elapsed before I entered the outhouse, it did not appear that the depredator had once alighted; but I am satisfied that it sucked the vital current from its victim as it flew, having probably seized it on the wing, and that it was seeking a quiet nook where it might devour the body at leisure. I kept both animals wrapped separately in my handkerchief till the next morning, when, procuring a convenient cage, I first put in the *Megaderma*, and after observing it some time I placed the other Bat with it. No sooner was the latter perceived than the other fastened on it with the ferocity of a tiger, again seizing it behind the ear, and made several efforts to fly off with it; but finding it must needs stay within the precincts of the cage, it soon hung by the hind legs to one side of its prison, and after sucking its victim till no more blood was left, commenced devouring it, and soon left nothing but the head and some portions of the limbs. The voidings observed very shortly afterwards in its cage resembled clotted blood, which will explain the statement of Stedman and others concerning masses of congealed blood being always observed near a patient who has been attacked by a South-American vampyre. Such, then, is the mode of subsistence of the *Megaderma*. The sanguivorous propensities of certain Bats inhabiting South America have long been notorious, but the fact has not heretofore been observed in the Old World; and the circumstance of one kind of Bat preying upon another is altogether new, though I think it not improbable that the same will be found to obtain among the larger species, if not throughout the whole extensive allied genus of *Rhinolophus*, which, like *Megaderma*, are peculiar to the eastern world."

In confirmation of these remarks, Mr. Frith afterwards informed Mr. Blyth "that a number of these Bats were in the habit of resorting to the verandah of his residence in Mymensing (Burmah), and that every morning the ground under them was strewed with the hind-quarters of frogs and the wings of large grasshoppers and crickets. On one occasion the remains of a small fish were observed; but frogs appeared to constitute their chief diet—never toads; and of a quiet evening these animals could be distinctly heard crunching the heads and smaller bones of their victims."

Other species of Bats were noticed to keep aloof from this retreat; but Mr. Frith had no opportunity of confirming Mr. Blyth's observations that the *Megaderma* preys upon the smaller animals of its own tribe.

Mr. Blyth's suggestion of the probability of the *Rhinolophi* preying upon other species is to a certain extent confirmed by my own observations, and is in all probability the reason why the larger species keep aloof in pairs, instead of congregating, as do some of the smaller kinds. I have found that *Rh. luctus*, *Phyllorhina armiger*, *Nycticejus luteus*, *Miniopterus blepotis*, and *Vespertilio blythii*, when confined with some smaller species than themselves, will prey upon them.

I know of an enormous cave at Mussooree to which various species, both large and small, are in the habit of resorting for rest and concealment during the day. Standing within this spacious vault in the earliest hours, just before the first streaks of day appear, the spectator is perfectly astonished at the numbers of Bats resorting to it—not, however, in one promiscuous crowd, but in separate detachments, each seeking its own particular quarter of the cavern, and alighting against the sides, at first within reach of a butterfly-net, and commence crawling upwards and backwards to spots beyond the reach of invasion from below. Here in one spot will be seen a pair of *Rhinolophus luctus*, hanging high up, and quite apart from all the rest; in another place hangs a pair of *Phyllorhina armiger*, the large ears and the facial crests in active tremulous motion as the head is turned in every direction to ascertain that no intruder is nigh its dwelling-place, until, this restlessness gradually passing off, the animal hangs at length quietly suspended by the feet. In another direction are a dozen or more of *Rhinolophus minor* rapidly scrambling all together like a lot of crabs up the inequalities of the rocky surface, and hurriedly disappearing into some deep narrow crack or crevice; while again, in another part, the same scene is observed, as dozens of a very small species of *Nycticejus* scramble into similar hiding-places, to rest in peace until the hour for again emerging in search of prey calls them all forth once more respectively at their appointed hours.